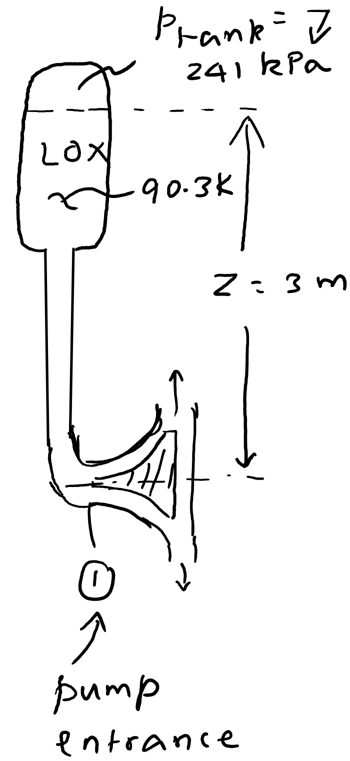
Ex:



$$SG_{LOX} = 1.14, \quad \dot{m} = 182 \text{ kg/s}, \quad z_{loss} = 1 \text{ m}$$

$$p_{01} = p_{tank} + \rho_{LOX} g z - \rho_{LOX} g z_{loss}$$

$$z_{01} = \frac{p_{01}}{\rho_{LOX} g} = z_{tank} + z - z_{loss}$$

$$z_{tank} = \frac{p_{01}}{\rho_{LOX} g} = \frac{(241)(1000)}{(1140)(9.81)} = 21.55 \text{ m}$$

$$z_{01} = 21.55 + 3 - 1 = 23.55 \text{ m}$$

$$p_v = 1013 \text{ mbar at } 90.3 \text{ K}$$

$$= 1013(10^{-3})(10^5) \text{ Pa} = 101300 \text{ Pa at } 90.3 \text{ K}$$

$$z_v = \frac{p_v}{\rho_{LOX} g} = \frac{101300}{(1140)(9.81)} = 9.06 \text{ m}$$

$$p_1 = p_{01} - \rho_{LOX} \frac{u_1^2}{2}$$

$$z_1 = \frac{p_1}{\rho_{LOX} g} = z_{01} - \frac{u_1^2}{2g}$$

$$u_1 = \frac{\dot{m}}{\rho_{LOX} A_1} = \frac{\dot{m}}{\rho_{LOX} \frac{\pi D_1^2}{4}} = \frac{182}{(1140)(0.009503)} = 16.8 \frac{\text{m}}{\text{s}}$$

$$z_1 = 23.55 - \frac{16.8^2}{2(9.81)} = 9.16 \text{ m}$$

$z_1 > z_v$. No cavitation.

{ NPSH, see later, is $\frac{p_{01} - p_v}{\rho_{LOX}\, g} = (z_{01} - z_v)$

$$= (23.55 - 9.06) = 14.49 \text{ m} \}$$

This is $(NPSH)_A$. The value of $(NPSH)_R$ is deduced from experiment.